# The Aeronautical Journal of the Royal Aeronautical Society

INCORPORATING THE INSTITUTION OF AERONAUTICAL ENGINEERS, THE HELICOPTER ASSOCIATION OF GREAT BRITAIN AND THE SOCIETY OF LICENSED AIRCRAFT ENGINEERS AND TECHNOLOGISTS

## VOLUME XCV

### JANUARY-DECEMBER 1991

### SUBJECT INDEX


**AERODYNAMICS**
- Calculation of support interferences on the aerodynamic coefficients for a windtunnel calibration model, D. Steinbach, pp 55-63 (Feb.).
- Unsteady aerodynamic modelling for aircraft lateral parameter estimation, J. Singh and S. C. Raisinghani, pp 88-94 (Mar.).
- *Technical Note* — Aerodynamics at the speed of sound, R. M. Denning, pp 132-137 (Apr.).
- The effects of icing on the dynamics response of thick aerofoils, C. A. Lucas, pp 231-240 (Aug./Sept.).
- The aerodynamic interference between a flapped tanker aircraft and a receiver aircraft during air-to-air refuelling, A. W. Bloy, V. Trochalidis and M. G. West, pp 274-282 (Oct.).

**AEROELASTICITY**
- A parameter study of the aeroelastic stability of a binary wing-with-engine nacelle flutter system in incompressible flow, H. Forsching and A. Senft, pp 359-369 (Dec.).

**AEROFOILS**
- Performance of improved thin aerofoil theory for modern aerofoil sections, K. Adu-Abdou and M. F. Zedan, pp 64-71 (Feb.).

**AEROSPACEPLANES**
- Heat transfer measurements of a biconic in hypervelocity nitrogen flow, S. L. Gai, T. Cain and W. S. Joe, pp 187-193 (June/July).

**AIR TO AIR REFUELLING**
- The aerodynamic interference between a flapped tanker aircraft and a receiver aircraft during air-to-air refuelling, A. W. Bloy, V. Trochalidis and M. G. West, pp 274-282 (Oct.).

**BOOK REVIEWS — AUTHORS**
- Agrawal, B. D. and Broutman, L. J., Analysis and Performance of Fiber Coposites — Second edition, p 138 (Apr.).
- Anderson, J. D., Fundamentals of Aerodynamics — Second edition, p 214 (June/July).
- Anderson, J. D., Modern Compressible Flow: with historical perspective — Second edition, p 248 (Aug./Sept.).
- Armanios, E. A. (Ed.), Interlaminar Fracture of Composites, p 170 (May).
- Askeland, D. R., The Science and Engineering of Materials — Second S. I. Edition, p 385 (Dec.).
- Barton, D. K. *et al.*, Radar Evaluation Handbook, p 248 (Aug./Sept.).
- Bertin, J. J. and Smith, M. L., Aerodynamics for Engineers — Second edition, p 107 (Mar.).
- Cumpsty, N. A., Compressor Aerodynamics, p 35 (Jan.).
- Dunn, B. D.,Metallurgical Assessment of Spacecraft Parts and Materials, p 248 (Aug./Sept.).
- Eichblatt, E. J. (Ed.), Test and Evaluation of the Tactical Missile, p 335 (Nov.).
- Eppler, R., Airfoil Design and Data, p 289 (Oct.).
- Freris, L. L. (Ed.), Wind Energy Conversion Systems, p 107 (Mar.).
- Gall-Or, B.,Vectored Propulsion, Supermanoeuvrability and Robot Aircraft, p 335 (June/July).
- Gdoutos, E. E., Fracture Mechanics Criteria and Applications, p 214 (June/July).
- Haftka, R. T. *et al.*, Elements of Structural Optimisation — Second revised edition, p 71 (Feb.).
- Lewis, R. I., Vortex Element Methods for Fluid Dynamic Analysis of Engineering Systems, p 289 (Oct.).
- McLean, D., Automatic Flight Contro Systems, p 35 (Jan.).
- Murthy, T. K. S. and Brebbia, C. A. (Eds), Computational Methods in Viscous Aerodynamics, p 138 (Apr.).
- Park, C., Nonequilibrium Hypersonic Aerothermodynamics, p 170 (May).
- Powell, K. G., Vortical Solutions of the Conical Euler Equations, p 335 (Nov.).
- Ramm, H. J., Fluid Dynamics for the Study of Transonic Flow, p 72 (Feb.).
- Rozvany, G. I. N., Structural Design via Optimality Criteria: the Prager Approach to Structural Optimisation, p 35 (Jan.).
- Ruijgrok, G. J. J., Elements of Airplane Performance, p 385 (Dec.).
- Williamson, M., The Communications Satellite, p 71 (Feb.).

**BOOK REVIEWS — TITLES**
- Aerodynamics for Engineers — Second Edition, J. J. Bertin and M. L. Smith, p 107 (Mar.).
- Airfoil Design and Data, R. Eppler p 289 (Oct.).
- Airfoil and Performance of Fiber Composites — Second edition, B. D. Agrawal and L. J. Broutman, p 138 (Apr.).
- Automatic Flight Control Systems, D. McLean, p 35 (Jan.).
- Compressor Aerodynamics, N. A. Cumpsty, p 35 (Jan.).
- Computational Methods in Viscous Aerodynamics, T. K. S. Murthy and C. A. Brebbia (Eds), p 38 (Apr.).
- Elements of Airplane Performance, G. J. J. Ruijgrok, p 385 (Dec.).
- Elements of Structural Optimisation — Second revised edition, R. T. Haftka *et al.* p 71 (Feb.).
- Fluid Dynamics for the Study of Transonic Flow, H. J. Ramm, p 72 (Feb.).
- Fracture Mechanics Criteria and Applications, E. E. Gdoutos, p 214 (June/July).
- Fundamentals of Aerodynamics — Second edition, J. D. Anderson, p 214 (June/July).
- Interlaminar Fracture of Composites, E. A. Armanios (Ed.), p 170 (May).
- Metallurgical Assessment of Spacecraft Parts and Materials, B. D. Dunn, p 248 (Aug./Sept.).
- Modern Compressible Flow: with historical perspective — Second edition, J. D. Anderson, p 248 (Aug./Sept).
- Nonequilibrium Hypersonic Aerothermodynamics, C. Park, p 170 (May).
- Radar Evaluation Handbook, D. K. Barton *et al.*, p 248 (Aug./Sept.)
- Structural Design via Optimality Criteria: the Prager Approach to Structural Optimisation, G. I. N. Rozvany, p 35 (Jan.).
- Test and Evaluation of the Tactical Missle, E. J. Eichblatt (Ed.), p 335 (Nov.).
- The Communications Satellite, M. Williamson, p 71 (Feb.).
- The Science and Engineering of Materials-Second S. I. Edition, D. R. Askeland, p 385 (Dec.).
- Vectored Propulsion Supermanoeuvrability and Robot Aircraft, B. Gal-Or, p 335 (Nov.).
- Vortex Element Methods for Fluids Dynamic Analysis of Engineered Systems, R. I. Lewis, p 289 (Oct.).
- Vortical Solutions of the Conical Euler Equations, K. G. Powell, p 335 (Nov.).
- Wind Energy Conversion Systems, L. L. Freris (Ed), p 107 (Mar.).

**BOUNDARY LAYER**
- Wide angle diffusers with passive boundary-layer control, S. Raghunathan, S. T. McIlwain and D. G. Mabey, pp 28-34 (Jan.).
- The glancing interaction of a Prandtl-Meyer expansion fan with a supersonic wake, M. K. Smart and R. J. Stalker, pp 39-47 (Feb.).
- An interferometric study of the shock interaction at a compression corner, L. C. Squire, P. J. Bryanston-Cross and X. Liu, pp 143-151 (May).
- Technical Note — Mean velocity and Reynolds shear stress in a turbulent boundary layer at low Reynolds numbers, D. K. Bisset and R. A. Antonia, pp 224-247 (Aug./Sept.).

**BUFFET**
- The effects of icing on the dynamic response of thick aerofoils, C. A. Lucas, pp 231-240 (Aug./Sept.).

**COMMUNICATION SATELLITES**
- Mobile satellite communications — current status of maritime systems, K. Thacker pp 351-358 (Dec.).

**COMPOSITE MATERIALS**
- A knowledge-based expert system for laminated composite strut design, C. M. L. Wu, J. P. H. Webber and S. K. Morton, pp 1-20 (Jan.).
- Free vibration of laminated beams and stiffened plates using a high order element, A. Mukherjee, pp 124-131 (Apr.).

**COMPUTATIONAL FLUID DYNAMICS**
- Recent developments in CFD at ARA, A. J. Bocci, pp 111-123 (Apr.).

**COMPUTER PROGRAMS**
- A knowledge-based expert system for laminated composite strut design, C. M. L. Wu, J. P. H. Webber and S. K. Morton, pp 1-20 (Jan.).

**CONTROL SYSTEMS**
- Effective optimal control of an aircraft engine, S. Mahmoud and D. McLean, pp 21-27 (Jan.).
- Optimal tracking problem applied to jet engine control, D. McLean and S. Mahmoud, pp 48-54 (Feb.).
- The application of high pressure ejectors to reaction control systems, P. Miller and M. W. R. Seel, pp 297-312 (Feb.).
- improved thin earofoil theory for modern aerofoil sections, K. Adu-Abdou and M. F. Zedan, pp 297-312 (Nov.).

**DESIGN AND DEVELOPMENT**
- Performance of improved thin aerofoil theory for modern aerofoil sections, K. Adu-Abdou and M. F. Zedan, pp 64-71 (Feb.).
- *Technical Note* — The flying wing supersonic transport, R. T. Jones, pp 103-106 (Mar.).

# The Aeronautical Journal of the Royal Aeronautical Society

INCORPORATING THE INSTITUTION OF AERONAUTICAL ENGINEERS, THE HELICOPTER ASSOCIATION OF GREAT BRITAIN AND THE SOCIETY OF LICENSED AIRCRAFT ENGINEERS AND TECHNOLOGISTS

## VOLUME XCV

### JANUARY-DECEMBER 1991

### SUBJECT INDEX


**AERODYNAMICS**
- Calculation of support interferences on the aerodynamic coefficients for a windtunnel calibration model, D. Steinbach, pp 55-63 (Feb.).
- Unsteady aerodynamic modelling for aircraft lateral parameter estimation, J. Singh and S. C. Raisinghani, pp 88-94 (Mar.).
- *Technical Note* — Aerodynamics at the speed of sound, R. M. Denning, pp 132-137 (Apr.).
- The effects of icing on the dynamics response of thick aerofoils, C. A. Lucas, pp 231-240 (Aug./Sept.).
- The aerodynamic interference between a flapped tanker aircraft and a receiver aircraft during air-to-air refuelling, A. W. Bloy, V. Trochalidis and M. G. West, pp 274-282 (Oct.).

**AEROELASTICITY**
- A parameter study of the aeroelastic stability of a binary wing-with-engine nacelle flutter system in incompressible flow, H. Forsching and A. Senft, pp 359-369 (Dec.).

**AEROFOILS**
- Performance of improved thin aerofoil theory for modern aerofoil sections, K. Adu-Abdou and M. F. Zedan, pp 64-71 (Feb.).

**AEROSPACEPLANES**
- Heat transfer measurements of a biconic in hypervelocity nitrogen flow, S. L. Gai, T. Cain and W. S. Joe, pp 187-193 (June/July).

**AIR TO AIR REFUELLING**
- The aerodynamic interference between a flapped tanker aircraft and a receiver aircraft during air-to-air refuelling, A. W. Bloy, V. Trochalidis and M. G. West, pp 274-282 (Oct.).

**BOOK REVIEWS — AUTHORS**
- Agrawal, B. D. and Broutman, L. J., Analysis and Performance of Fiber Coposites — Second edition, p 138 (Apr.).
- Anderson, J. D., Fundamentals of Aerodynamics — Second edition, p 214 (June/July).
- Anderson, J. D., Modern Compressible Flow: with historical perspective — Second edition, p 248 (Aug./Sept.).
- Armanios, E. A. (Ed.), Interlaminar Fracture of Composites, p 170 (May).
- Askeland, D. R., The Science and Engineering of Materials — Second S. I. Edition, p 385 (Dec.).
- Barton, D. K. *et al.*, Radar Evaluation Handbook, p 248 (Aug./Sept.).
- Bertin, J. J. and Smith, M. L., Aerodynamics for Engineers — Second edition, p 107 (Mar.).
- Cumpsty, N. A., Compressor Aerodynamics, p 35 (Jan.).
- Dunn, B. D.,Metallurgical Assessment of Spacecraft Parts and Materials, p 248 (Aug./Sept.).
- Eichblatt, E. J. (Ed.), Test and Evaluation of the Tactical Missile, p 335 (Nov.).
- Eppler, R., Airfoil Design and Data, p 289 (Oct.).
- Freris, L. L. (Ed.), Wind Energy Conversion Systems, p 107 (Mar.).
- Gall-Or, B.,Vectored Propulsion, Supermanoeuvrability and Robot Aircraft, p 335 (June/July).
- Gdoutos, E. E., Fracture Mechanics Criteria and Applications, p 214 (June/July).
- Haftka, R. T. *et al.*, Elements of Structural Optimisation — Second revised edition, p 71 (Feb.).
- Lewis, R. I., Vortex Element Methods for Fluid Dynamic Analysis of Engineering Systems, p 289 (Oct.).
- McLean, D., Automatic Flight Contro Systems, p 35 (Jan.).
- Murthy, T. K. S. and Brebbia, C. A. (Eds), Computational Methods in Viscous Aerodynamics, p 138 (Apr.).
- Park, C., Nonequilibrium Hypersonic Aerothermodynamics, p 170 (May).
- Powell, K. G., Vortical Solutions of the Conical Euler Equations, p 335 (Nov.).
- Ramm, H. J., Fluid Dynamics for the Study of Transonic Flow, p 72 (Feb.).
- Rozvany, G. I. N., Structural Design via Optimality Criteria: the Prager Approach to Structural Optimisation, p 35 (Jan.).
- Ruijgrok, G. J. J., Elements of Airplane Performance, p 385 (Dec.).
- Williamson, M., The Communications Satellite, p 71 (Feb.).

**BOOK REVIEWS — TITLES**
- Aerodynamics for Engineers — Second Edition, J. J. Bertin and M. L. Smith, p 107 (Mar.).
- Airfoil Design and Data, R. Eppler p 289 (Oct.).
- Airfoil and Performance of Fiber Composites — Second edition, B. D. Agrawal and L. J. Broutman, p 138 (Apr.).
- Automatic Flight Control Systems, D. McLean, p 35 (Jan.).
- Compressor Aerodynamics, N. A. Cumpsty, p 35 (Jan.).
- Computational Methods in Viscous Aerodynamics, T. K. S. Murthy and C. A. Brebbia (Eds), p 38 (Apr.).
- Elements of Airplane Performance, G. J. J. Ruijgrok, p 385 (Dec.).
- Elements of Structural Optimisation — Second revised edition, R. T. Haftka *et al.* p 71 (Feb.).
- Fluid Dynamics for the Study of Transonic Flow, H. J. Ramm, p 72 (Feb.).
- Fracture Mechanics Criteria and Applications, E. E. Gdoutos, p 214 (June/July).
- Fundamentals of Aerodynamics — Second edition, J. D. Anderson, p 214 (June/July).
- Interlaminar Fracture of Composites, E. A. Armanios (Ed.), p 170 (May).
- Metallurgical Assessment of Spacecraft Parts and Materials, B. D. Dunn, p 248 (Aug./Sept.).
- Modern Compressible Flow: with historical perspective — Second edition, J. D. Anderson, p 248 (Aug./Sept).
- Nonequilibrium Hypersonic Aerothermodynamics, C. Park, p 170 (May).
- Radar Evaluation Handbook, D. K. Barton *et al.*, p 248 (Aug./Sept.)
- Structural Design via Optimality Criteria: the Prager Approach to Structural Optimisation, G. I. N. Rozvany, p 35 (Jan.).
- Test and Evaluation of the Tactical Missle, E. J. Eichblatt (Ed.), p 335 (Nov.).
- The Communications Satellite, M. Williamson, p 71 (Feb.).
- The Science and Engineering of Materials-Second S. I. Edition, D. R. Askeland, p 385 (Dec.).
- Vectored Propulsion Supermanoeuvrability and Robot Aircraft, B. Gal-Or, p 335 (Nov.).
- Vortex Element Methods for Fluids Dynamic Analysis of Engineered Systems, R. I. Lewis, p 289 (Oct.).
- Vortical Solutions of the Conical Euler Equations, K. G. Powell, p 335 (Nov.).
- Wind Energy Conversion Systems, L. L. Freris (Ed), p 107 (Mar.).

**BOUNDARY LAYER**
- Wide angle diffusers with passive boundary-layer control, S. Raghunathan, S. T. McIlwain and D. G. Mabey, pp 28-34 (Jan.).
- The glancing interaction of a Prandtl-Meyer expansion fan with a supersonic wake, M. K. Smart and R. J. Stalker, pp 39-47 (Feb.).
- An interferometric study of the shock interaction at a compression corner, L. C. Squire, P. J. Bryanston-Cross and X. Liu, pp 143-151 (May).
- Technical Note — Mean velocity and Reynolds shear stress in a turbulent boundary layer at low Reynolds numbers, D. K. Bisset and R. A. Antonia, pp 224-247 (Aug./Sept.).

**BUFFET**
- The effects of icing on the dynamic response of thick aerofoils, C. A. Lucas, pp 231-240 (Aug./Sept.).

**COMMUNICATION SATELLITES**
- Mobile satellite communications — current status of maritime systems, K. Thacker pp 351-358 (Dec.).

**COMPOSITE MATERIALS**
- A knowledge-based expert system for laminated composite strut design, C. M. L. Wu, J. P. H. Webber and S. K. Morton, pp 1-20 (Jan.).
- Free vibration of laminated beams and stiffened plates using a high order element, A. Mukherjee, pp 124-131 (Apr.).

**COMPUTATIONAL FLUID DYNAMICS**
- Recent developments in CFD at ARA, A. J. Bocci, pp 111-123 (Apr.).

**COMPUTER PROGRAMS**
- A knowledge-based expert system for laminated composite strut design, C. M. L. Wu, J. P. H. Webber and S. K. Morton, pp 1-20 (Jan.).

**CONTROL SYSTEMS**
- Effective optimal control of an aircraft engine, S. Mahmoud and D. McLean, pp 21-27 (Jan.).
- Optimal tracking problem applied to jet engine control, D. McLean and S. Mahmoud, pp 48-54 (Feb.).
- The application of high pressure ejectors to reaction control systems, P. Miller and M. W. R. Seel, pp 297-312 (Feb.).
- improved thin earofoil theory for modern aerofoil sections, K. Adu-Abdou and M. F. Zedan, pp 297-312 (Nov.).

**DESIGN AND DEVELOPMENT**
- Performance of improved thin aerofoil theory for modern aerofoil sections, K. Adu-Abdou and M. F. Zedan, pp 64-71 (Feb.).
- *Technical Note* — The flying wing supersonic transport, R. T. Jones, pp 103-106 (Mar.).

**DIFFUSERS**
Wide angle diffusers with passive boundary-layer control, S. Raghunathan, S. T. McIlwain and D. G. Mabey, pp 28-34 (Jan.).

**ELECTRIC PROPULSION**
Small satellites and electric propulsion — a review, R. Lorenz, pp 204-213 (June/July).

**EUROPEAN ENGINEERING**
1991 Handley Page Lecture — The engineering dimension in Europe, pp 341-350 (Dec.).

**EXPANSION TUBES**
High enthalpy, hypervelocity flows of air and argon in an expansion tube, A. J. Neely, R. J. Stalker and A. Paull, pp 175-186 (June/July).

**FINITE ELEMENT ANALYSIS**
Free vibration of laminated beams and stiffened plates using a high order element, A. Mukherjee, pp 124-131 (Apr.).
Analysis of general shells by flat facet finite element approximation, D. J. Allman, pp 194-203 (June/July).

**FLIGHT SIMULATION**
Unsteady aerodynamic modelling for aircraft lateral parameter estimation, J. Singh and S. C. Raisinghani, pp 88-94 (Mar.).

**FLOW VISUALISATION**
Validation of transonic turbulent flows past delta wing configurations, A. Hilgenstock, pp 219-230 (Nov.).
Holographic techniques for whole-field thermal and fluid measurements, M. W. Collins, pp 313-323 (Nov.).

**FLUID DYNAMICS:FLOW**
Solution of the Reynolds averaged Navier-Stokes, equations for transonic aerofoil flows, L. J. Johnston, pp 253-273 (Oct.).

**FLUTTER**
A parametric study of the aeroelastic stability of a binary wing-with-engine nacelle flutter system in incompressible flow, H. Forsching and A. Senft, pp 359-369(Dec.).

**GROUND EFFECT**
An investigation of a hovering rotor in ground effect, A. Graber, A. Rosen and A. Seginer, pp 161-169 (May).

**GUST LOADING**
International standardisation of regulations for gust load calculations, J. M. Saucray, C. Artigues, G. Squeglia and J. Guillot, p 370-378 (Dec.).
Gust effects on a flexible aircraft, P. Santini and P. Gasbarri, p 379-384.

**HEAT TRANSFER**
High enthalpy, hypervelocity flows of air and argon in an expansion tube, A. J. Neely, R. J. Stalker and A. Paull, pp 175-186 (June/July).
Heat transfer measurements on a biconic in hypervelocity nitrogen flow, S. L. Gai, T. Cain and W. S. Joe, pp 187-193 (June/July).

**HISTORICAL**
A tribute to the leading assistant designers of British wartime aeroplanes, Sir Alfred Pugsley, pp 241-243 (Aug./Sept.)

**HOLOGRAPHY**
Holographic techniques for whole-field thermal and fluid measurements, M. W. Collins, pp 313-323 (Nov.).

**HYPERSONICS**
Shock-shock, shock-vortex interaction and aerodynamic heating in hypersonic corner flow, N. Qin, K. W. Scriba and B. E. Richards, pp 152-160 (May).
High enthalpy, hypervelocity flows of air and argon in an expansion tube. A. J. Neely, R. J. Stalker and A. Paull, pp 175-186 (June/July).
Heat transfer measurements on a biconic in hypervelocity nitrogen flow, S. L. Gai, T. Cain and W. S. Joe, pp 187-193 (June/July).
Mach 4 and Mach 8 axisymmetric nozzle for a high-enthalpy shock tunnel, pp 324-334 (Nov.).

**ICING**
The effects of icing on the dynamic response of thick aerofoils, C. A. Lucas, pp 231-240 (Aug./Sept.).

**JETS**
Jet inflow simulation and its downwash effects on lifting surfaces, P. A. O. Soviero and J. B. V. Wanderley, pp 283-288 (Jan.).

**MECHANICS OF STRUCTURES**
A knowledge-based expert system for laminated composite strut design, C. M. L. Wu, J. P. H. Webber and S. K. Morton, pp 1-20 (Oct.).
Free vibration of laminated beams and stiffened plates using a high order element, A.Mukherjee, pp 124-131 (Apr.).
Analysis of general shells by flat facet finite element approximation, D. J. Allman, pp 194-203 (June/July).

**NACELLES**
A parametric study of the aeroelastic stability of a binary wing-with-engine nacelle flutter system in incompressible flow, H. Forsching and A. Senft, pp 359-369 (Dec.).

**PHOTOGRAPHS**
**Aircraft**
Short S.25 Sunderland Mk V, p 241 (Aug./Sept.).
Hawker Hurricane IIc, p 242 (Aug./Sept.).
Avro Lancaster Bomber type 683, p 242 (Aug./Sept.).
Vickers Wellington Mk X, p 243 (Aug./Sept.).
Supermarine Spitfire Mk IX, p 243 (Aug./Sept.).

**Cabin fires**
Damage after third burn test, p 84 (Mar.).
Limitation of internal damage to unprotected areas, p 85 (Mar.).

**Electric propulsion**
UK-10 ion thruster, p 208 (June/July).
Exhaust plume from a UK-10 ion thruster under test, p 209 (June/July).
Propellant handling hardware for the UK-10 ion propulsion system, p 209 (June/July).

**Flow visualisation**
Comparison between oil flow picture and skin friction line, p 223 (Aug./Sept.)
Canard-vortex stretching in the water tunnel of TU Braunschweig, p 229 (Aug./Sept.).

**Icing**
Natural double horn ice formation in flight, p 232 (Aug./Sept.).

**Interferograms**
Interferogram of the undisturbed boundary layer, p 144 (May).
Interferograms of the interaction at the 11° corner for various inlet boundary layers, p 147 (May).
Differential interferogram of the undisturbed boundary layer at t = 10 s, p 150 (May).
Differential interferogram of the interaction over the 11° corner, p 150, (May).
Typical interferograms, (a) in a cascade tunnel, (b) over a roughness element, p 316 (Nov.)
Forced convection over a smooth plate, p 319 (Nov.)

**Jet engines**
CFM 566-3 engine following fan blade failure, p 86 (Mar.).

**Satellite communications**
Inmarsat-A antenna with protective radome, p 351 (Dec.).
Inmarsat-A equipped fishing vessel, p 352 (Dec.).
Inmarsat-A antenna mounted high and free of obstructions, p 352 (Dec.).
The BT Inmarsat antenna at Goonhilly, p 353 (Dec.).
A typical Inmarsat-C configuration, p 353 (Dec.).
An Inmarsat antenna mounted on a Gulfstream IV, p 355 (Dec.).
An Inmarsat-A transportable terminal; 1- or 2-suitcase models available, p 356 (Dec.).
Inmarsat-2 goes into orbit, p 357 (Dec.).

**Small satellites**
Final adjustments being made to UoSAT-4 satellite, p 205 (June/July).
UoSAT 3 and 4, plus four AMSAT microsatellites are mated with the ASAP structure at the Ariane launch site in French Guiana, p 206 (June/July).

**Wind tunnel models**
The calibration model in the 3 m windtunnel at DLR Gottingen, p 56 (Feb.).
Oblique winged model in 11 ft tunnel, p 104 (Mar.).

**PROPULSION**
Effective optimal control of an aircraft engine, S. Mahmoud and D. McLean, pp 21-27 (Jan.).
Optimal tracking problem applied to jet engine control, D. McLean and S. Mahmoud, pp 48-54 (Feb.).
Recent developments in CFD at ARA, A. J. Bocci, pp 111-123 (Apr.).
The applications of high pressure ejectors to reaction control systems, P. Miller and M. W. R. Seel, pp 297-312 (Nov.).

**ROTORCRAFT**
An investigation of a hovering rotor in ground effect, A. Graber, A. Rosen and A. Seginer, pp 161-169 (May).

**ROYAL AERONAUTICAL SOCIETY: LECTURES**
Air safety regulation and its commercial impact, R. Ashford, pp 77-87 (Mar.).
1991 Handley Page Lecture — The engineering dimension in Europe, pp 341-350 (Dec.).

**ROYAL AERONAUTICAL SOCIETY: SYMPOSIA**
FLOW VISUALISATION USING LASER TECHNIQUES
Warwick, 10 May 1990.
Holographic techniques for whole-field thermal and fluid measurements, M. W. Collins, pp 313-323 (Nov.).
INTERNATIONAL CONFERENCE ON HYPERSONIC AERODYNAMICS,
Manchester, 4-6 September 1989.
Shock-shock, shock-vortex interaction and aerodynamic heating in hypersonic corner flow, N. Qin, K. W. Scriba and B. E. Richards, pp 152-160 (May).
SIXTEENTH EUROPEAN ROTORCRAFT FORUM,
Glasgow, 18-20 September 1990.
An investigation of a hovering rotor in ground effect, A. Graber, A. Rosen and A. Seginer, pp 161-169 (May).

**SAFETY REGULATION**
Air safety regulation and its commercial impact, R. Ashford, pp 77-87 (Mar.).

**SCRAMJETS**
The glancing interaction of a Prandtl–Meyer expansion fan with a supersonic wake, M. K. Smart and R. J. Stalker, pp 39-47 (Feb.).

SHOCK WAVES
An interferometric study of the shock interaction at a compression corner, L. C. Squire, P. J. Bryanston-Cross and X. Liu, pp 143-151 (May).
Shock-shock, shock-vortex interaction and aerodynamic heating in hypersonic corner flow, N. Qin, K. W. Scriba and B. E. Richards, pp 152-160 (May).

**SMALL SATELLITES**
Small satellites and electric propulsion — a review, R. Lorenz, pp 204-213 (June/July).

**STANDARDS**
International standardisation of regulations for gust load calculations, J. M. Saucray, C. Artigues, G. Squeglia and J. Guillot, pp 370-378 (Dec.).

**STRUCTURES AND STRUCTURAL DESIGN**
A knowledge-based expert system for laminated composite strut design, C. M. L. Wu, J. P. H. Webber and S. K. Morton, pp 1-20 (Jan.).
Analysis of general shells by flat facet finite element approximation, D. J. Allman, pp 194-203 (June/July).

**SUPERSONIC AIRCRAFT**
*Technical Note* — The flying wing supersonic transport, R. T. Jones, pp 103-106 (Mar.).

**SUPERSONIC WAKES**
The glancing interaction of a Prandtl–Meyer expansion fan with a supersonic wake, M. K. Smart and R. J. Stalker, pp 39-47 (Feb.).

**SWIRL**
Effect of swirl on mixing of co-axial jets, S. N. Singh, D. P. Agrawal, R. C. Malhotra and A. K. Raghava, pp 95-102 (Mar.).

**TRANSONIC FLOW**
Validation of transonic turbulent flows past delta wing configurations, A. Hilgenstock, pp 219-230 (Aug./Sept.).
Solution of the Reynolds averaged Navier–Stokes equations for transonic aerofoil flows, L. J. Johnston, pp 253-273 (Oct.).

**TURBULENCE**
*Technical Note* — Mean velocity and Reynolds shear stress in a turbulent boundary layer at low Reynolds numbers, D. K. Bisset and R. A. Antonia, pp 244-247 (Aug./Sept.).

**VIBRATION**
Free vibration of laminatged beams and stiffened plates using a high order element, A. Mjkherjee, pp 124-131 (Apr.).

**VORTICES**
Shock-shock, shock-vortex interaction and aerodynemic heating in hypersonic corner flow, N. Qin, K. W. Scriba and B. E. Richards, pp 152-160 (May).

**WIND TUNNELS**
Calculations of support interferences on the aerodynamic coefficients for a wind-tunnel calibration model, D. Steinbach, pp 55-63 (Feb.).
Mach 4 and Mach 8 Axisymmetric nozzle for a high-enthalpy shock tunnel, pp 324-334 (Nov.).

**WINGS**
Performance of improved thin aerofoil theory for modern aerofoil sections, K. Adu-Abdou and M. F. Zedan, pp 64-71 (Feb.).
Validation of transonic turbulent flows past delta wing configurations, A. Hilgenstock, pp 219-230 (Aug./Sept.).

## AUTHOR INDEX

**ABU-ABDOU, K. and ZEDAN, M. F.**
Performance of improved thin aerofoil theory for modern aerofoil sections, pp 64-70 (Feb.).

**AGRAWAL, D. P., MALHOTRA, R. C., RAGHAVA, A. K. and SINGH, S. N.**
Effect of swirl on mixing of co-axial jets, pp 95-102 (Mar.).

**ALLMAN, D. J.**
Analysis of general shells by flat facet finite element approximation, pp 194-203 (June/July).

**ANTONIA, R. A. and BISSET, D. K.**
*Technical Note* — Mean velocity and Reynolds shear stress in a turbulent boundary layer at low Reynolds numbers, pp 244-247 (Aug./Sept.).

**ARTIGUES, C., SQUEGLIA, G., GUILLOT, J. and SAUCRAY, J. M.**
International standardisation of regulations for gust load calculations, pp 370-378 (Dec.).

**ASHFORD, R.**
Air safety regulation and its commercial impact, pp 77-87 (Mar.).

**BISSET, D. K. and ANTONIA, R. A.**
*Technical Note* — Mean velocity and Reynolds shear stress in a turbulent boundary layer at low Reynolds numbers, pp 244-247 (Aug./Sept.).

**BLOY, A. W., TROCHALIDIS, V. and WEST, M. G.**
The aerodynamic interference between a flapped tanker aircraft and a receiver aircraft during air-to-air refuelling, pp 274-282 (Oct.).

**BOCCI, A. J.**
Recent developments in CFD at ARA, pp 111-123 (Apr.).

**BRYANSTON–CROSS, P. J., LIU, X. and SQUIRE, L. C.**
An interferometric study of the shock interaction at a compression corner, pp 143-151 (May).

**CAIN, T., JOE, W. S. and GAI, S. L.**
Heat transfer measurements on a biconic in hypervelocity nitrogen flow, pp 187-193 (June/July).

**COLLINS, M. W.**
Holographic techniques for whole-field thermal and fluid measurements, pp 313-323 (Nov.).

**DENNING, R. M.**
*Technical Note* — Aerodynamics at the speed of sound, pp 132-137 (Apr.).

**FORSCHING, H. and SENFT, A.**
A parametric study of the aeroelastic stability of a binary wing-with-engine nacelle flutter system in incompressible flow, pp 359-369 (Dec.).

**GAI, S. L., CAIN, T. and JOE, W. S.**
Heat transfer measurements on a biconic in hypervelocity nitrogen flow, pp 187-193 (June/July).

**GASBARRI, P. and SANTINI, P.**
Gust effects on a flexible aircraft, pp 379-384 (Dec.).

**GRABER, A., ROSEN, A. and SEGINER, A.**
An investigation of a hovering rotor in ground effect, pp 161-169 (May).

**GUILLOT, J., SAUCRAY, J. M., ARTIGUES, C. and SQUEGLIA, J.**
International standardisation of regulations for gust load calculations, pp 370-378 (Dec.).

**HILGENSTOCK, A.**
Validation of transonic turbulent flows past delta wing configurations, pp 219-230 (Aug./Sept.).

**JACOBS, P. A. and STALKER, R. J.**
Mach 4 and Mach 8 axisymmetric nozzle for a high-enthalpy shock tunnel, pp 324-334 (Nov.).

**JOE, W. S., GAI, S. L. and CAIN, T.**
Heat transfer measurements on a biconic in hypervelocity nitrogen flow, pp 187-193 (June/July).

**JOHNSTON, L. J.**
Solution of the Reynolds averaged Navier–Stokes equations for transonic aerofoil flows, pp 253-273 (Oct.).

**JONES, R. T.**
*Technical Note* — The flying wing supersonic transport, pp 103-106 (Mar.).

**LEVY, J. C.**
1991 Handley Page Lecture — The engineering dimension in Europe, pp 341-350 (Dec.).

**LIU, X., SQUIRE, L. C. and BRYANSTON-CROSS, P. J.**
An interferometric study of the shock interaction at a compression corner, pp 143-151 (May).

**LORENZ, R.**
Small satellites and electric propulsion — a review, pp 204-213 (June/July).

**LUCAS, C. A.**
The effects of icing on the dynamic response of thick aerofoils, pp 231-240 (Aug./Sept.).

**MABEY, D. G., RAGHUNATHAN, S. and McILWAIN, S. T.**
Wide angle diffusers with passive boundary-layer control, pp 28-34 (Jan.).

**MAHMOUD, S. and McLEAN, D.**
Effective optimal control of an aircraft engine, pp 21-27 (Jan.).

**MAHMOUD, S. and McLEAN, D.**
Optimal tracking problem applied to jet engine control, pp 48-54 (Feb.).

**MALHOTRA, R. C., RAGHAVA, A. K., SINGH, S. N. and AGRAWAL, D. P.**
Effect of swirl on mixing of co-axial jets, pp 95 102 (Mar.).

**McILWAIN, S. T., MABEY, D. G. and RAGHUNATHAN, S.**
Wide angle diffusers with passive boundary-layer control, pp 28-34 (Jan.).

**McLEAN, D. and MAHMOUD S.**
Effective optimal control of an aircraft engine, pp 21-27 (Jan.).

**McLEAN D. and MAHMOUD, S.**
Optimal tracking problem applied to jet engine control, pp 48-54 (Feb.).

**MILLER, P and SEEL, M. W. R.**
The application of high pressure ejectors to reaction control systems, pp 297-312 (Nov.).

**MORTON, S. K., WU, C. M. L. and WEBBER, J. P. H.**
A knowledge-based expert system for laminated composite strut design, pp 1-20 (Jan.).

**MUKHERJEE, A.**
Free vibration of laminated beams and stiffened plates using a high order element, pp 124-131 (Apr.).

**NEELY, A. J., STALKER, R. J. and PAULL, A.**
High enthalpy, hypervelocity flows of air and argon in an expansion tube, pp 175-186 (June/July).

**PAULL, A., NEELY, A. J. and STALKER, R. J.**
High enthalpy, hypervelocity flows of air and argon in an expansion tube, pp 175-186 (June/July).

**PUGSLEY, Sir Alfred**
A tribute to the leading assistant designers of British wartime aeroplanes, pp 241-243 (Aug./Sept.).

**QIN, N., SCRIBA, K. W. and RICHARDS, B. E.**
Shock-shock, shock-vortex interaction and aerodynamic heating in hypersonic corner flow, pp 152-160 (May).

**RAGHAVA, A. K., SINGH, S. N., AGRAWAL, D. P. and MALHOTRA, R. C.**
Effect of swirl on mixing of co-axial jets, pp 95-102 (Mar.).

**RAGHUNATHAN, S., McILWAIN, S. T. and MABEY, D. G.**
Wide angle diffusers with passive boundary-layer control, pp 28-34 (Jan.).

**RAISINGHANI, S. C. and SINGH, J.**
Unsteady aerodynamic modelling for aircraft lateral parameter estimation, pp 88-94 (Mar.).

**RICHARDS, B. E., QIN, N. and SCRIBA, K. W.**
Shock-shock, shock-vortex interaction and aerodynamic heating in hypersonic corner flow, pp 152-160 (May).

**ROSEN, A., SEGINER, A. and GRABER A.**
An investigation of a hovering rotor in ground effect, pp 161-169 (May).

**SANTINI, P. and GASBARRI, P.**
Gust effects on a flexible aircraft, pp 379-384 (Dec.).

**SAUCRAY, J. M., ARTIGUES, C., SQUEGLIA, G. and GUILLOT, J.**
International standardisation of regulations for gust load calculations, pp 370-378 (Dec.).

**SCRIBA, K. W., RICHARDS, B. E. and QIN, N.**
Shock-shock, shock-vortex interaction and aerodynamic heating in hypersonic corner flow, pp 152-160 (May).

**SEEL, M. W. R. and MILLER, P.**
The application of high pressure ejectors to reaction control systems, pp 297-312 (Nov.).

**SENFT, A. and FORSCHING, H.**
A parametric study of the aeroelastic stability of a binary wing-with-engine nacelle flutter system in incompressible flow, pp 359-369 (Dec.).

**SEGINER, A., GRABER A. and ROSEN, A.**
An investigation of a hovering rotor in ground effect, pp 161-169 (May).

**SINGH, J. and RAISINGHANI, S. C.**
Unsteady aerodynamic modelling for aircraft lateral parameter estimation, pp 88-94 (Mar.).

**SINGH, S. N., AGRAWAL, D. P., MALHOTRA, R. C. and RAGHAVA, A. K.**
Effect of swirl on mixing of co-axial jets, pp 95-102 (Mar.).

**SMART, M. K. and STALKER, R. J.**
The glancing interaction of a Prandtl–Meyer expansion fan with a supersonic wake, pp 39-47 (Feb.).

**SOVIERO, P. A. O. and WANDERLEY, J. B. V.**
Jet inflow simulation and its downwash effects on lifting surfaces, pp 283-288 (Oct.).

**SQUEGLIA, G., GUILLOT, J., SAUCRAY, J. M. and ARTIGUES, C.**
International standardisation of regulations for gust load calculations, pp 370-378 (Dec.).

**SQUIRE, L. C., BRYANSTON-CROSS, P. J. and LIU, X.**
An interferometric study of the shock interaction at a compression corner, pp 143-151 (May).

**STALKER, R. J. and SMART, M. K.**
The glancing interaction of a Prandtl–Meyer expansion fan with a supersonic wake, pp 39-47 (Feb.).

**STALKER, R. J., PAULL, A. and NEELY, A. J.**
High enthalpy, hypervelocity flows of air and argon in an expansion tube, pp 175-186 (June/July).

**STALKER, R. J. and JACOBS, P. A.**
Mach 4 and Mach 8 axisymmetric nozzle for a high-enthalpy shock tunnel, pp 324-334 (Nov.).

**STEINBACH, D.**
Calculations of support interferences on the aerodynamic coefficients for a windtunnel calibration model, pp 55-63 (Feb.).

**THACKER, K.**
Mobile satellite communications — current status of maritime systems, pp 351-358 (Dec.).

**TROCHALIDIS, V., WEST, M. G. and BLOY, A. W.**
The aerodynamic interference between a flapped tanker aircraft and a receiver aircraft during air-to-air refuelling, pp 274-282 (Oct.).

**WANDERLEY, J. B. V. and SOVIERO, P. A. O.**
Jet inflow simulation and its downwash effects on lifting surfaces, pp 283-288 (Oct.).

**WEBBER, J. P. H., MORTON, S. K. and WU, C. M. L.**
A knowledge-based expert system for laminated composite strut design, pp 1-20 (Jan.).

**WEST, M. G., BLOY, A. W. and TROCHALIDIS, V.**
The aerodynamic interference between a flapped tanker aircraft and a receiver aircraft during air-to-air refuelling, pp 274-282 (Oct.).

**WU, C. M. L., WEBBER, J. P. H. and MORTON, S. K.**
A knowledge-based expert system for laminated composite strut design, pp 1-20 (Jan.).

**ZEDAN, M. F. and ABU-ABDOU, K.**
Performance of improved thin aerofoil theory for modern sections, pp 64-70 (Feb.).

# The Aeronautical Journal

The Editorial Staff would like to thank all the referees who provided valuable comments throughout 1991. Those who assisted on papers which reached a conclusion this year are listed below.

| | | |
|---|---|---|
| D. J. Allman | J. E. Green | A. R. Perkins |
| R. V. Barrett | M. J. Grimble | M. G. Philpot |
| L. Bernstein | A. B. Haines | B. Probert |
| A. Bocci | G. J. Hancock | E. C. P. Ransom |
| P. Bryanston-Cross | M. E. Inglis | G. T. Roberts |
| J. F. Clarke | J. B. Jamieson | P. L. Roe |
| L. F. Crabtree | E. M. Kasenally | A. J. Ross |
| G. J. Dadd | D. L. I. Kirkpatrick | J. J. Spillman |
| D. E. Davies | G. M. Lilley | L. C. Squire |
| G. A. O. Davies | D. G. Mabey | P. G. Street |
| P. B. Earnshaw | A. R. Martin | J. L. Stollery |
| R. A. East | I. M. McGregor | A. E. Sutton |
| J. A. Edwards | A. Morris | F. Vann |
| D. G. Fearn | A. R. G. Mundell | J. P. H. Webber |
| J. W. Flower | R. K. Nangia | B. R. Williams |
| R. A. McD. Galbraith | R. S. Neve | D. D. Williams |
| J. C. Gibson | G. D. Padfield | R. R. Woburn |

We are also indebted to Mr John Shaw of ESDU International for his assistance in the preparation of the Reports section each month.